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SURGERY

A MONTHLY REVIEW OF SURGICAL SCIENCE AND PRACTICE

EDITED BY

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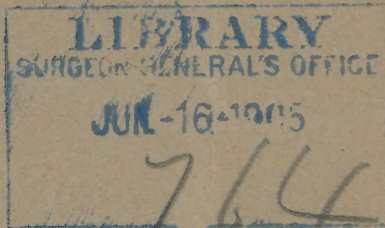
MAY, 1896

AN INTRACRANIAL IMPLANTATION DERMOID TUMOR.

By FRANK HARTLEY, M.D.,

OF NEW YORK,

Surgeon to the New York Hospital; Assistant Surgeon to Roosevelt Hospital.



MAINTENANCE
F. L. B. 1000

AN INTRACRANIAL IMPLANTATION DERMOID TUMOR.¹

By FRANK HARTLEY, M.D.,

OF NEW YORK,

SURGEON TO THE NEW YORK HOSPITAL; ASSISTANT SURGEON TO ROOSEVELT
HOSPITAL.

MRS. T., forty-six years of age, was admitted to the Roosevelt Hospital August 13, 1894, stating that she had always enjoyed good health. Ten years before she struck her forehead a severe blow against the corner of a door, at which time she noticed that the region of the injury was painful upon pressure, with a slight cut in the skin, beneath which there seemed to be a small hole in the bone large enough to admit the tip of the finger.

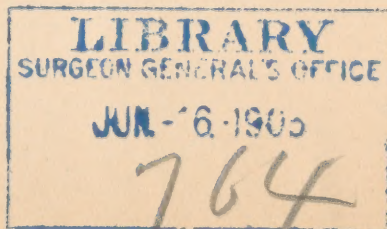
The cut healed, and though the depression could be felt for a long time, it was subsequently, at the end of two years, followed by a prominence or swelling at the spot where formerly the depression existed. This swelling had never been painful except upon deep pressure, nor had she suffered from this injury, unless her occasional headaches be looked upon as symptomatic.

The examination of the patient showed her to be a robust and healthy woman. Upon the forehead, just to the left of the median line, was a tumor one and a half inches in diameter and elevated about half an inch. The tumor was elastic, smooth, and circumscribed. It was not adherent to the overlying skin. On deep pressure there seemed to be an irregular opening in the bone following irregularly the outline of the tumor. The edge of the opening was sharp and irregular. No pulsation could be obtained in the tumor.

On August 17, under ether, I made an omega incision with the base above the tumor. The flap was dissected up, including the skin and subcutaneous tissue.

Beneath this flap was a layer of tissue apparently continuous with

¹ Read before the New York Surgical Society, February 26, 1896.



the periosteum at the margin of the tumor. It was not adherent to the skin except opposite the centre of the flap raised. It was bluish in color and bulged distinctly forward. This layer was divided along its edge and removed, exposing an irregularly-rounded opening in the frontal bone. Behind this opening could be seen a mass of soft gelatinous material covered by a very thin capsule, which was continuous with the layer above, as well as with the dura mater upon the bony margin. The soft gelatinous material was removed with a spoon and sponge, leaving a cavity which extended backward (a little farther upon the roof than upon the floor of the skull) for about two inches. The upper boundary consisted of the vault of the skull covered by the dura. The posterior boundary, a sloping one, consisted apparently of the normal pia pushed back by the growth. The inferior boundary was the horizontal plate of the frontal bone, in which there was a funnel-shaped opening leading into the frontal sinus. The anterior limit of the tumor was the irregular and thin opening in the vertical plate of the frontal bone, one and a half inches in diameter. The pia mater at the back of the cavity laid in loose folds. During the operation it could be noticed that the brain was expanding very slowly and loosening the folds in the pia mater. The edge of the bone was trimmed so as to present an even margin. The capsule, so far as it could be recognized, was removed. The cavity was loosely packed with sterile gauze. The skin-flap was brought down and sutured with catgut along its sides, the tip being left open to remove the packing. Aseptic dressings were then applied.

The contents of the cavity consisted of a whitish-gray matter, arranged in concentric layers and in spheroidal form, each of about the consistency and thickness of heavy paper. At the centre of this globular mass was a ball, half an inch in diameter, of a dark-brown material of the consistency of oatmeal. The entire mass formed a sphere of a semisolid matter, breaking up readily under the instruments.

August 22. The cavity was still clean. The brain had advanced considerably.

August 29. Cavity was filled up about one-third by the advance of the brain.

September 1. Cavity was granulating and becoming smaller.

September 26. Cavity was slowly closing. It was lined with granulations, which gave rise to a slight discharge.

There had been no infection during the treatment.

September 27. She was discharged with a small opening and referred to the Out-Patient Department for further treatment.

The microscopical examination made by Dr. Ewing, of Roosevelt Hospital, showed that the capsule was a modified form of skin. In a few places the epidermis was composed of the usual number of epithelial cells of normal size, among which the prickle-cells of the Malpighian layer were positively identified. At other points the epithelial layer consisted of only two or three thinly-flattened cells, or was reduced to a homogeneous, highly refractive line resembling the stratum lucidum of the epidermis. Everywhere the innermost rows of cells presented the translucent appearance of the stratum corneum. No trace of dermal papillæ could be found. No hair follicles, nor sebaceous nor sudoriparous glands were present to account for the large mass of sebaceous matter constituting the body of the tumor. At one edge of the capsule, beneath the epidermic layer, were a number of trabeculæ of bone. These were surrounded by a layer of osteoblasts, suggesting the development of bone in the foetal skull. The centre of these trabeculæ failed to stain with hæmatoxylon or eosin, and were, therefore, not ossified.

A few rather large nerve-trunks and blood-vessels, several lobules of fat, and a thick and dense layer of connective tissue uniting the capsule with the scalp completed the section of the tissue which might properly be considered the capsule of the cyst.

The body of the tumor consisted of a central necrotic area of fatty matter, showing large cholesterin crystals embedded in a matrix of disorganized granular matter, staining deep red with eosin. Towards the periphery the contents of the cyst assumed a more or less lamellar arrangement, and here and there the layers, whose gross appearance was of wax, proved to be, on section, unaltered fat. A fine granular coagulum spread in a net-work through the fat and gave the mass the appearance of fat-tissue.

The question naturally arises as to whether this is not a dermoidal tumor, and we must answer it in the affirmative, but only in so far as we mean by that term such tumors as are in general furnished with skin or mucous membrane, and occur in situations where these structures are not found under normal conditions. To be more precise, congenital dermoidal tumors include tubulo-dermoids, ovarian dermoids, dermoidal patches, and sequestration dermoids. In this situation we would have

only to deal with those tumors arising in detached portions of surface epithelium in situations where, during embryonic life, coalescence between skin-covered surfaces takes place,—*i.e.*, the sequestration dermoid.

In this situation the congenital dermoid occurs either in the orbito-nasal fissure or as a dermoid of the scalp. In the orbito-nasal fissure, these tumors occur in three different situations :

(1) At the outer angle of the orbit, in close relation with the pericranium, covering the frontal bone in the immediate neighborhood of the external angular process.

(2) At the inner angle of the orbit, where they are less frequently seen. They have the same intimate relation with the dura as in other varieties in this situation.

(3) In the upper eyelid, between the fronto-nasal plate and the cutaneous fold, from which the eyelid is formed. In the lower segment of this fissure the dermoids occupy the nasofacial sulcus.

At the root of the nose, over the fontanelles, at the occipital protuberance, and less frequently in other portions of the scalp, dermoids are also found. Here they are frequently attached to the dura mater by a pedicle which traverses a hole in the underlying bone, unless it be over a fontanelle. In the occipital region, dermoids may lie beneath the occipital bone in close relation to the tentorium cerebelli.

The origin of these tumors is based upon the fact that in embryonic life the dura and skin are in contact. On the base and side walls the membranous cranium gradually chondrifies and a separation between the dura and skin takes place. On the vault bone itself develops between the dura and the skin, except over the anterior fontanelle, along the sutures and over the torcular. If an imperfect separation of the skin from the dura takes place, the permanent adherence will give rise to a dermoidal tumor. Such a tumor may remain attached to the dura with the bulk of the mass situated in a shallow depression of bone, the centre of which depression represents the point of adhesion to the dura. In other cases a pedicle surrounded by bone serves to show the connection with the dura. This same variety may undergo a

still further modification in that the growing bone separates the tumor from the skin, and the future development of the mass takes place beneath the bone and outside the dura mater. In this class of dermoids microscopical examination has shown a cyst wall analogous to the skin, with its epidermis, its corium, its sebaceous glands, and hair-follicles. The contents of the cyst have been found to be a white or yellow and fatty material mingled with hairs and sometimes containing cartilage or bone. On the contrary, in this case, we find no trace of papillæ, no hair-follicles, no sebaceous glands. The bone present in the cyst wall is a part of the frontal taken away with the cyst wall in order to obtain a complete view of the tumor.

Can this growth be classed as that variety of dermoid or atheroma which is now classed as cholesteatoma or pearl tumor, and is considered as endothelioma (Chiari, Eppinger, and Eberth) originating in the endothelium of the vessels the periepithelium of their sheaths or from that of the lymphatics? The contents of these tumors are either fat, cholesterin, or pearl-like masses of cells. Under the name of cholesteatoma or pearl tumors they have been found in the pia mater, mastoid antrum, parotid and thyroid glands, in the testicle, ovary, kidney, and tonsil, or as a part of other tumors. To me it seems scarcely probable that this tumor can be classed as an endothelioma. It seems improbable that the mutability of the endothelial cells could be so complete as to leave no trace of their existence, and to produce a cyst wall so distinctly epidermal in its character and structure.

The third variety of tumor, to which, I think, this may belong, is the implantation cysts,—*i.e.*, tumors caused by the accidental transplantation of a portion of the surface epithelium or the hair-bulbs into the underlying connective tissue. These have been described as sebaceous or dermal cysts as well as dermoids. They should form, however, a distinct group of themselves. They occur most frequently upon the fingers of shoemakers, carpenters, and tailors. M. Muron (1868) was the first to describe them, although he did not associate an injury as

being the cause. He mentions, however, their occurrence in working-people. Reverdin, Garré, Franke, and Blumberg have reported cases occurring in the hands, and many ophthalmologists have seen them in the eye. In these cases the tumors have been either cystic or solid, and their appearance has been that of mother-of-pearl. They have been surrounded by a connective tissue capsule, the inner surface of which has been covered with epithelium. The cavity has been in most instances filled with epithelium arranged in concentric layers with cholesterol crystals and fat. Sudoriparous and sebaceous glands have not been present.

Weil and Wernher have classed them as dermoids. Graefe has described them in the eye as intra-ocular cysts dependent upon an implantation of epidermis within the ocular tissue as the result of injury. Buhl and Rothmund have classed them as implantation cysts. Collins has named them epithelial cysts—false cysts—in contradistinction to true or endothelial cysts. Blumberg considers these intra-ocular tumors, epithelial cysts, the etiology, the macroscopical and microscopical characters of which he maintains are the same as those in the palm of the hand. Experimental work upon the eye has pretty definitely settled the fact that the solid tumors (pearl tumors) and the serous cysts have no fundamental but only a gradual difference in structure.

In order to substantiate this theory of the origin of such tumors, Kaufmann marked off upon a cock's comb, by an oval or rounded incision, a piece of the comb which he sank in the tissue by uniting the line of incision. After some time he found closed cysts, the contents of which consisted of epithelial cells arranged in concentric layers. Garré, as well as Kaufmann, supposed that these pieces of skin transplanted in the tissue required to remain in connection with the mother tissue in order to form new epithelium. In the intra-ocular cysts and tumors this has been shown not to be a prerequisite. Both pieces of the lids and the mucous membrane of the lip have grown when transplanted within the eye.

Monoyer and Cornil and Ranvier maintain that the pearl tumors of the brain are similar to the epithelial tumors of the

hand and eye. They class what has been formerly called "*Cystes Epidermiques des Doigts*," "*Die traumatische Epithel Cysten der Finger*," the dermoid and atheroma of the *vola manus* the same as these pearl tumors.

Treves has reported such a tumor in the scalp in a woman twenty-nine years of age. It was situated over the external occipital protuberance. It measured seven centimetres in diameter. It was cystic with walls lined internally with skin furnished with hair five or eight centimetres long. The cavity contained sebaceous matter and mucus-like fluid. The patient affirmed that the tumor appeared after a lacerated wound of the scalp eight years ago. The scar was still evident, and Treves reports it as an implantation cyst resulting from this injury. Etiologically the views are somewhat different, since many maintain that they are alone derivable from epithelium, and a few believe that they may originate from either endo- or epithelium. On the other hand, otologists place what they call *cholesteatoma* in a class by itself, giving as an example the fact that in the ear, without suppuration, the desquamated epithelium may collect in masses, dry, and by irritation to the mucosa, lead to a proliferation of the epithelium, which compassed in concentric layers forms a tumor.

Franke and Labougle maintain that trauma acts as a cause in only a small proportion of cases.

Labougle, in forty-two cases in which this variety of tumor was present in the *vola manus*, found that in sixteen trauma existed in a causative relation. In the remaining twenty-six cases he thinks that embryological-cell masses destined for the formation of the epidermis became separated at the interdigital folds, and maintaining a vegetative activity of their own, give rise by irritations, such as trauma, to epithelial tumors.

Franke does not believe that this view will hold good for other portions of the body. He would explain their origin either by a separation of the epithelium destined to become glands and their remaining so until in extra-uterine life they form tumors of themselves, or by trauma in extra-uterine life portions of the epidermis or of the glands became separated and subsequently developed to cysts or pearl tumors.

These tumors derived from portions of the epidermis and with a capsule composed alone of epidermis are called by Franke epidermoids, whereas, those in which the wall consists of the epidermis and glandular appendages are classed as dermoids. Briggs, of Boston, who reports a case in the finger, says, "One theory is that these cysts are true dermoid, and that in the cases where they occur there was an embryonic inclusion at this point. But they have never yet been found in children and seldom at puberty. They usually occur in adults. No case has been reported containing hair, teeth, nails, or other of the contents found in dermoid cysts. Plastic heterotopia, or formation of tissue in unusual places, has also been advocated as the explanation. It seems to me that this is not an explanation.

"It is a noteworthy fact that in all cases the cyst follows an injury of the affected finger. It is also to be noted that the wall of this cyst is skin-like in structure. These two facts have led to the belief, in which the writer concurs, that these cysts are due to preceding injury in which a fragment of skin is forced in and transplanted subcutaneously."

A fragment of skin may be very frequently carried in at the time of the injury, but it is almost invariably either killed by the injury or is disposed of in the healing process. But, once in a great many thousand times, this fragment retains its vitality, becomes engrafted on the subcutaneous tissues, and after a dormant period of, usually from four months to two years, the cyst develops.

The consensus of opinion of those who have done the most work in this class of growths seems to be in favor of placing some of the pearl tumors, the cholesteatomata, and the epithelial tumors, of the variety here described, in the same group, believing that the location, the duration of their existence, and the greater or less vascularity of the part so influences their growth that at one time they appear solid and at another time cystic.

The tumor presented in this paper is, in my mind, one of this latter variety due to the trauma which occurred ten years previous to her admission, at which time she was thirty-six years of age, and had never noticed anything suggesting trouble with

her head. I believe that the injury resulted in a compound, depressed fracture of the skull of small extent, and the implantation of either the epidermis or of the glandular appendages to the skin in the tissue beneath the bone and dura mater, or between the bone and dura mater. The subsequent growth of the tumor showed no malignancy but displaced tissues by its pressure until, at the end of ten years, it arrived at the size mentioned. From the history of the case and the microscopic examination it appears more probable to me that this tumor should be classed as an implantation dermoid due to the trauma, rather than to blindly accept the idea that the trauma awakened the growth of a congenital or sequestration dermoid.

DISCUSSION.

DR. F. TILDEN BROWN said he had seen Dr. Hartley operate on this very interesting case, and had secured some of the contents of the cyst, which he examined with considerable care. At first he thought it was a dermoid, although its situation was exceptional and it lacked some of the contents usually seen in dermoids, but on looking up the subject he had come to view the case as undoubtedly an example of dermal implantation cyst as described by the reader. He had found only one somewhat similar case in the English language, reported by Treves. It involved the occipital region in a woman, and followed an injury. The aperture in the frontal bone in Dr. Hartley's case was of considerable size, much larger, he supposed, than at the time of the injury, and was caused apparently by pressure of the tumor producing atrophy.

DR. HOWARD LILIENTHAL mentioned the fact that about a year and a half ago a German author, whose name he could not recall, reported two cases of this kind and referred to the literature. One of the cases was in the finger of a sewing-woman, the other in the finger of a soldier, and both patients, if he recollected correctly, came for operation two or three years after the original injury. The tumors had attained about the size of a pea, which, for their duration, corresponded with that of the tumor in Dr. Hartley's case. He did not doubt the correctness of the diagnosis in the case just reported.

